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THE ECONOMIC ROLE OF GOVERNMENT: REFORM AS A MECHANISM DESIGN PROBLEM

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Economic Reform in many countries now means the establishment of well-functioning markets. Yet the government must manage the process of reducing its own role in certain ways. And the government is often subject to the same kinds of pressures which caused distortions of markets in the first place. Very often the government is seen as the arbiter of who gets what in an economy., and its political support depends on how it handles this role. In the case of market-oriented reforms, the government cannot tackle the issues of distribution and allocation separately by, say, creating markets and then correcting distribution through appropriate lump-sum transfers, because it cannot directly identify winners and losers. One approach to analyzing the government's role is therefore to explicitly incorporate informational constraints and constraints based on political support.

In this paper I summarize this approach using work of Robert Feenstra, Tracy Lewis and Roger Ware on price reform, which derives the implication of reducing tariffs or producer subsidies in a mechanism design framework. I discuss how the political constraints used in this work might be modified to take account of some self-interest of government regulators, beyond that captured by constraints that require some minimum fraction of the population not to be hurt by reform. Examples include modifications of the objective function of regulator/reformers and active lobbying by interest groups which also affects government objectives.

The paper also considers privatization in the mechanism design framework. I suggest how work of Michael Riordan and David Sappington on privatization by auctioning monopoly franchises can be extended to incorporate political constraints of various kinds.

The paper generally suggests that particular reform policies, either in the sphere of price adjustment or of asset reallocation, must be designed with the particular political constraints, including likely responses of affected groups, incorporated in the analysis. Neglecting this can lead to unintended negative consequences of reform measures. Furthermore, the precise policy adopted may be sensitive to the nature and degree of political constraints. Finally, the paper suggests a systematic way of incorporating political factors in designing reform policies.

The Economic Role of Government: Reform as a Mechanism Design Problem*

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The Economic Role of Government: Reform as a Mechanism Design Problem

The majority of the world's nations today face numerous issues of economic reform. This includes formerly centrally planned economies as well as less developed countries whose policies had been influenced by socialist models. The goal of reform is to establish well-functioning markets. Conventional economic theory provides simple answers that neglect several basic realities. The simple answers are of the form: let markets allocate resources and let governments maintain law and order, protect property rights, and, if necessary, compensate some people with lump-sum transfers that do not distort market prices. The realities neglected by this prescription include: the costs of adjustment in the transition to well-functioning markets, the lack of information of the government for allocating property rights and compensating losers (this lack of information akin to those that made the socialist model inefficient in the first place!), and the constraints imposed by limited political credibility of governments—whether of formerly centrally planned or of third world countries.

Mechanism design is an approach of economic theory that incorporates constraints imposed by the mechanism designer's lack of information and by the need for policies that will be acceptable in some way (to be specified) for the participants in the mechanism. For "mechanism designer" read government. For "mechanism" read "price policy," "institutional framework," etc. For "participants in the mechanism" read "population" or "constituents of the government." Then we have a beginning for understanding some of the issues in implementing market-oriented economic reforms around the world. One caveat is in order. This approach is somewhat static, in that it does not model the specifics of adjustment over time, though it can allow for multiple time periods. This is obviously a limitation, one I hope to tackle in the future with a separate set of analytical tools (models of uncertainty, adjustment costs and hysteresis). For now it would add intractable complexity. Finally, note that the mechanism design approach is not limited to assumptions of benevolence on the part of government. Even political decision-makers pursuing market-oriented reforms may have their own interests at heart. This

can be allowed for in the mechanism-design approach, as well as rent-seeking, lobbying, or other behavior that seeks to modify government objectives.

The application of mechanism design to market-oriented reform seems paradoxical. Are we not seeking to limit the role of government, not enhance it? Again, this depends on how we apply the theory. If we start with status quo situations of controlled prices and state control of resources, and examine how to bring prices closer to equilibrium, or how to privatize resources, then the application is appropriate. Furthermore, the final answer depends on the status quo, because of the combination of informational and acceptability constraints. I hope these points, if not clear at this stage, will be transparent once examples have been presented and analyzed. The next step is to comment briefly on the economic issues of market-oriented reform.

Issues of Economic Reform

The most basic issue of economic reform is the reallocation of property rights. In formerly centrally planned economies, the major part of the economy is nominally state-owned. Public enterprises also abound in less developed countries. While countries such as France have grown successfully and rapidly with sizable state-owned sectors, it seems unobjectionable that the government has not been an efficient producer of private goods in most cases. The policy question is then, how much to privatize and how to do it? Political issues are very much to the forefront in discussions of this question. Whether the privatization involves a major portion of the economy, or just specific firms or sectors, constituents of the government and participants in the process are concerned that the process be "fair." One way of looking at this is the distribution of the returns that are associated with the ownership of firms or other assets to be privatized. These returns can be normal economic returns, or supernormal returns, i.e., economic rents. The latter might be done away with if the ensuing market structure can be made competitive. If this is not practicable, one can think of extracting the rents in the process of selling the assets, e.g., through an appropriate auction scheme. This will be discussed later as a mechanism design problem.

Another way of controlling rents when it is not efficient to have a perfectly competitive market structure is to regulate prices. This seems dangerously close to what economic reform is meant to get away from, but one might usefully explore this option as an interim policy in many cases. In fact, even if a public firm is not to be privatized, the appropriate price policy to impose on the firm will need to be considered. In a world of perfect information the government's optimal price policy will be somewhat different than in a world where the government does not know the firm's costs, demand or both.

Price policy is an issue that also occurs in economic reform discussions independent of reallocations of property rights. Formerly centrally planned economies and many less developed countries have relied extensively on administered prices that are not market clearing, or have substantially distorted prices through taxes and subsidies. In addition quantity controls, which can be viewed as complements of non-market clearing prices, have been extensively used. The simplest scenario would be one where, once property rights are allocated, and market institutions set up, no government interventions in pricing were necessary. Two complications arise. First, while reform may be made possible by a shift in the equations of political and economic power, there still may be constraints imposed by political acceptability. To take the example of Feenstra and Lewis (1991), the price of an import good may be held at a high level through a substantial tariff. The government, for an unspecified reason, becomes able to adjust the tariff. Switching to free trade will hurt domestic suppliers, and it is not possible to directly identify and compensate them through non-distortionary lump-sum transfers. If no one must be harmed by the revised price structure, a lower non-linear tariff may achieve some measure of reform, in that at least some of the population is made better off. In such a framework, unless something else changes, no further improvements are possible: the nonlinear tariff is a second-best policy. However, what might change is the nature of the political acceptability constraint. As the government's economic reforms gain credibility, perhaps by generating improvements in the productive capacity of the economy, a further movement away from tariffs may be possible. The second complication arises from the fact that the government must raise revenue from taxes

to finance public goods such as infrastructure and defense. One can incorporate such considerations through the standard optimal tax framework, where a given amount of revenue must be raised through a system of taxes on goods and services (since lump-sum taxes are informationally and distributionally not feasible), but with the addition of political acceptability constraints that reflect the fact that such tax systems are movements from a status quo position.

Why do such movements become possible? Why were they not enacted earlier? The answer must lie in the nature of government objectives as well as in the nature of political acceptability constraints. The former may change to reflect a movement from dictatorship to participatory democracy, or a change in the relative strengths of influence groups, or both. The latter may change for similar reasons, though not necessarily in a conforming direction. A dictatorship may have weaker political acceptability constraints but less broad based objectives (only caring about their own welfare or rents) than a participatory democracy.

A third category of decisions, in addition to allocation of property rights and policies towards pricing, is the setting up of appropriate market institutions. The most obvious example of this is stock exchanges: if firms are to be privatized, the initial and continued efficiency of the allocation of property rights in firms' assets will depend on the ability to trade those assets at relatively low cost whenever desired. One kind of issue then is the type of trading process to use, e.g. bid-ask market vs. the use of specialist. Perhaps more important are rules concerning insider trading, short selling and the like. For example, wide participation in share markets in India has required more effective regulation of the stock exchange. Financial intermediation more generally is a sector where reform, including possibly a creation of completely new institutions, as well as deregulation of old ones, appears to be crucial. In the creation or modification of market institutions, designing a "mechanism" is more than a one-time policy for allocating initial property rights or setting prices. Instead the mechanism governs repeated interactions among economic agents as they trade. Since trade in financial assets and claims is the most complex, it is the natural example. However, other examples of institutional rules as mechanisms suggest themselves. If for example, we think of whole firms as assets, then

industrial policy including rules on entry, exit and mergers, may also be conceived of as a set of rules governing the trading process of assets. While formerly centrally planned economies will face such decisions more as their industry becomes privatized, countries such as India must squarely face the reform of industrial policy. A web of quantitative and discretionary controls certainly hinders the allocation of capital to its most productive uses. Of course the theory was that government representatives would make decisions to reflect social benefits in the allocation of capital and labor, rather than private benefits. In practice, the results are lobbying by industry and non-social welfare objectives of government decision-makers. Again, what is happening in practice in India is that there is a change in objectives, but also a change in political acceptability constraints. Such a change opens up the possibility of reform of industrial policy. Because the political constraints are still present, reform will not be a complete deregulation, though that might be optimal in a world without such constraints, even with a lack of information about firms' costs, demand, etc. Once again, lack of information prevents overcoming political constraints by simply making lump-sum transfers from winners to potential losers from the reform.

I have presented a selective and idiosyncratic view of issues of economic reform. A more typical categorization of issues might be in terms of sectors: financial sector reform, trade policy reform, agricultural and industrial sector reforms, etc. The merit of the above approach is to focus on economic issues that cut across sectors of the economy. In the process, I have also tried to indicate how these reform issues may be viewed as mechanism design problems. This will next be developed in some detail by considering some examples.

Price Reform

In this section I summarize and discuss two contributions to the understanding of price reform in situations with incomplete information and political acceptability constraints. Feenstra and Lewis (1991) analyze tariff reduction in an exchange economy. Lewis, Feenstra and Ware (1989) examine subsidy reduction in an economy with production.

In the Feenstra-Lewis (FL) model, there are two goods x and y . The initial price of x is p^0 , y is the numeraire. All individuals have the same initial endowment y_0 of good y , but different endowments of good x . Individual of type θ has endowment θ of x , and the distribution of θ in the economy is given by c.d.f. $F(\theta)$. Every individual of type θ has the quasi-linear utility function

$$U(x,y,\theta) = y_0 + y + \Phi(x + \theta).$$

In this notation x and y also represent the net purchases of the two goods.

Each individual initially solves

$$\max U(x,y,\theta) \text{ subject to } p^0 x + y = 0.$$

If the solution to this is denoted $x^0(\theta)$, $x^{0'}(\theta) = -1$, and if $x^0 < 0$ (> 0) the individual is a seller (buyer) of good x . It is assumed that the economy as a whole is a net purchaser of x , i.e. x is an import good. Algebraically,

$$\int_{\underline{\theta}}^{\bar{\theta}} x^0(\theta) dF(\theta) > 0.$$

Since $x^{0'}(\theta) < 0$, there is a cutoff value of $\hat{\theta}$ below which individuals are buyers.

Now if tariffs are removed, so that the price of imports x falls from p^0 to p^1 , which is the world price, all those who were previously buyers of x will continue to buy and be better off. Some former sellers of x who switch to being buyers will also be better off. But sellers of x who continue to be net sellers will now be worse off. If this set of people who is worse off is large enough, the trade liberalization may not be politically feasible.

In a standard equilibrium model, the government could identify the losers and winners from the switch to free trade, and there would be a set of lump sum transfers from winners to potential losers that would make everyone better off with the price fall. This possibility arises because the initial situation was by assumption not Pareto optimal. In practice, since the government cannot observe individuals' types or infer them by observing their trades, it cannot use differential lump sum transfers. It could conceivably use an identical payment to every one which, if large

enough, would make even the largest seller of x no worse off after the price fall, but such a policy could be prohibitively costly. The conclusion is that a combination of informational, political and budget constraints can make infeasible the conventional economic prescription for trade reform.

It does not follow that no reform is feasible. FL proceed to derive the optimal policy in the presence of all the above constraints. The optimal policy is in the form of a continuous menu of pairs (T, x) , where T is a fee paid (or subsidy received if $T < 0$) by the individual in return for the right to buy a specified quantity x (or sell it if $x < 0$) at the world price p^1 . This seems to require observability of individual trades to enforce, but it turns out to be equivalent to a menu of the form $\{L(\theta), t(\theta)\}$, where L is a lump-sum subsidy or tax, and t is a per-unit tax or subsidy independent of x . This latter interpretation is therefore in terms of two-part tariffs. Each individual can choose from this menu of two-part tariffs, and thereafter individual trades need not be supervised. The derivation of the optimal policy, however, is more convenient in terms of the menu $\{T(\theta), x(\theta)\}$. Note that though we write the menus as functions of the endowments, θ , this does not imply θ is observable. The form of writing is permitted by the revelation principle, which says that θ will be revealed through self-selection.

The government is assumed to choose to maximize social welfare in the form of the expected or aggregate utility of all individuals in the economy. If \bar{B} is some fixed budget the government has to work with, the objective is

$$\text{maximize } \int_{\bar{\theta}}^{\theta} \left\{ \Phi(x(\theta) + \theta) + y_0 - p^1 x(\theta) - T(\theta) + T(\theta) + \bar{B} \right\} dF(\theta)$$

The transfers $T(\theta)$ cancel out in the aggregate social welfare calculations.

In choosing the optimal policy, we can apply the revelation principle, which says that there is no loss from restricting attention to policies that induce individuals to pick the menu option meant for their type. Hence the informational constraint takes the form of an incentive compatibility constraint:

$$U(T(\theta), x(\theta), \theta) \geq U(T(\theta'), x(\theta'), \theta) \text{ for all } \theta, \theta'.$$

The political acceptability constraint is used by FL in its strongest form, i.e. the policy must be unanimously acceptable. This might be the case with a very weak government, or one that is very responsive to its constituents. In practice, this would also occur if the large sellers of x (high θ individuals) must be protected because they are politically influential. The simple constraint used by FL is therefore:

$$U(\theta) \geq U^0(\theta) \text{ for all } \theta,$$

where $U^0(\theta)$ is the maximum utility for type θ at price p^0 . Note finally that this constraint is precisely the same as the "individual rationality" constraint in usual applications of mechanism design, where individuals can opt out of the mechanism if it is beneficial for them to do so.

The last constraint is the budget constraint:

$$\int_{\underline{\theta}}^{\bar{\theta}} T(\theta) dF(\theta) + \bar{B} \geq 0.$$

If $\bar{B} = 0$, the government has no resources from elsewhere to use in implementing the trade liberalization. If \bar{B} is large enough, then a large enough standard payment to each individual will overcome both the other constraints in allowing free trade to be implemented.

We present the essentials of the FL solution, with a view to discussing its implications, and possible modifications. The techniques of solution are quite standard. As long as the budget constraint is binding, and the political acceptability constraint is binding only at $\bar{\theta}$, the optimal policy turns out to be a nonlinear tariff schedule $\tau(x)$, where $\tau(x) \geq 0$ and $\tau'(x) < 0$, i.e., the tariff rate is lower for larger x . Hence, for example it is lower for buyers than for sellers of x . It remains true at the optimum that $x'(\theta) < 0$, so that the tariff rate is higher for higher θ . The transfer $T(x)$ associated with net purchase x is related to the marginal tariff rate by $T'(x) = \tau(x)$. It is likely that for low enough x , i.e. for large sellers of x , there is a subsidy, which compensates them for the fall in the price of the good they sell. Finally, the utility of individual θ at the new equilibrium is

$$U(\theta) = U^0(\bar{\theta}) - \int_0^{\bar{\theta}} \Phi'(x(z) + z) dz,$$

where in fact $\Phi'(x + \theta(x)) = \tau(x) + p^1$, and $\theta(x)$ is the inverse of $x(\theta)$ i.e., this is the new marginal price inclusive of the tariff. Note that since individual marginal rates of substitution are not equated, there is a distortion still present: this is part of the second-best nature of the solution which relies on self-selection to separate individuals with different endowments. Since the original price distortion of x vs. y is reduced, the solution is still an improvement on the initial equilibrium.

The fact that $T''(x) = \tau'(x) < 0$, which means that $T(x)$ is strictly concave, allows the reinterpretation of the policy as a menu of linear schedules $\{L(\theta), t(\theta)\}$, so that individuals can be thought of as choosing from a set of two part tariffs, as noted earlier.

The first question that arises in interpreting this analysis is the realism of the political acceptability constraint. It turns out that this is easy to relax in some ways. The simplest way of doing this is to replace the constraint with

$$U(\theta) \geq \delta U^0(\theta),$$

where $0 \leq \delta \leq 1$. This allows the FL solution technique to be applied without changes. There is no difference in $\tau(x)$: only $T(x)$ is shifted down. Individual θ 's utility becomes

$$U(\theta) = \delta U^0(\bar{\theta}) - \int_{\bar{\theta}}^{\theta} \Phi'(x(z) + z) dz$$

since this is still increasing in θ , there is some value of θ say θ^* , such that all those with $\theta \leq \theta^*$ are not hurt by the liberalization. Hence the measure of individuals made better off is $F(\theta^*(\delta))$. Since θ^* is increasing in δ , if we alternatively start off with some critical level of majority M (equal to $1/2$ or $2/3$, for example), $F(\theta^*(\delta)) = M$ defines the appropriate level of δ . The advantage of working with the parameter δ , as noted, is that it allows the form of the political acceptability constraint to be unchanged.

Another possibility is that the distribution of individuals according to their type θ does not reflect their relative political power. Instead, suppose that the distribution of political power is represented by the c.d.f. $G(\theta)$. If $G(\theta) < F(\theta)$, which would be an example of first-order

stochastic dominance, this would capture the idea that political power is skewed towards those individuals with higher θ 's, i.e., larger endowments of the import good. This might be quite a realistic situation in some circumstances. Now interpret M as some critical level of political acceptability. Then the required δ is determined by $G(\theta^*(\delta)) = M$. In our example, given M , if $G(\theta) < F(\theta)$, then $\delta_G > \delta_F$ i.e., the political acceptability constraint is tighter, as we would expect.

A criticism of the two approaches I have suggested above is that they neglect two important practical issues. One is the possibility that political constituents actively lobby to affect policy in ways that have real resource costs. A second, more subtle point is that because voters may choose to be rationally ignorant, less transparent policies are easier to implement than ones which are too explicit in their effects. On the first point, there is a large literature on rent-seeking. This literature is surveyed and extended in some directions in Kohli (1992). Kohli and Singh (1993a, b) also provide some analysis of active rent-seeking situations. The second point is the subject of a penetrating analysis in Olson (1992).¹ I proceed to sketch briefly how these two issues can be handled.

First consider active rent-seeking. In the FL model, we can allow the government's weighting of types to be represented by the c.d.f. $G(\theta)$ as above, with G not necessarily the same as F . The difference in the following will be that G is determined by rent-seeking or lobbying. While there is a continuum of types, we will suppose that the lobbying is undertaken by two groups. We will assume the groups are determined as follows. When the price of imports is reduced from p^0 to p^1 , there will be a cutoff value of θ which separates potential winners from potential losers. Since some sellers may switch to being buyers, this cutoff value, which we now denote θ_1 , is no less than $\hat{\theta}$, the dividing line between initial sellers and buyers. The set of potential losers is $A \equiv [\theta_1, \bar{\theta}]$ and the set of potential winners is $B \equiv [\underline{\theta}, \theta_1]$. These two sets constitute the groups, which we assume collectively decide to spend c_l and c_w respectively.

¹ I am grateful to Christopher Clague for this reference.

We assume that this affects the government in the following way. The c.d.f. it uses in evaluating policies is $G(\theta, c_1 - c_w)$, with $G_2 \leq 0$; the subscript denoting the partial derivative with respect to the second argument. If there is no other political bias, we can assume that $G(\theta, 0) = F(\theta)$, but this is not necessary.

It remains to describe how c_1 and c_w are determined. Two assumptions pin down group behavior with respect to these lobbying costs. First, each group behaves in a Nash manner, i.e., chooses its best response to given behavior by the other. Second, each group correctly anticipates the effect of its actions on the government's policy. Recall that that policy is represented by a menu $\{T(\theta), x(\theta)\}$. But this menu depends on $c_1 - c_w$ through G . Hence the maximized utility of type θ also depends on $c_1 - c_w$. We can denote it by $U(\theta, c_1 - c_w)$. Hence, for example, group A chooses c_1 to solve:

$$\max_{c_1} \int_{\theta_1}^{\bar{\theta}} U(\theta, c_1 - c_w) dF(\theta) - c_1.$$

A similar decision is made by group B, and together their best response functions determine the Nash equilibrium (c_1, c_w) , and hence $G(\theta, c_1 - c_w)$, and finally the optimal policy.

A further complication now can arise with respect to the political constraint. The government may feel constrained not to make either group worse off. For group A, this would add the constraint

$$\int_{\theta_1}^{\bar{\theta}} U(\theta, c_1 - c_w) dF(\theta) - c_1 \geq \int_{\theta_1}^{\bar{\theta}} U^0(\theta) df(\theta).$$

A similar constraint might hold for group B. These constraints may hold instead of or in addition to the type of constraint suggested by FL. Another possibility is that this new constraint matters only for the group which is in a majority. Clearly several possibilities exist, and the more the political constraints and the more they bite, the less will be the possible reform. Our purpose here has been to indicate how active rent-seeking might be introduced into the FL mechanism design model.

Turning now to the issue that less transparent policies are easier to implement, we suggest the following approach, which is a modification of the above rent-seeking model. Recall that the menu $\{T(\theta), x(\theta)\}$ is equivalent to a menu $\{L(\theta), t(\theta)\}$ where L is a lump-sum subsidy or tax, and t is a per-unit tax or subsidy independent of the quantity traded. We may assume that lump-sum subsidies are the most transparent policy, and therefore politically the most difficult to implement. Furthermore, group A is more likely to be the target of lump-sum subsidies in the FL-type solution. Hence we may assume that the government's weighting of types is given by the c.d.f. $G(\theta, c_1, c_w)$, where $G_2 \leq 0$ and $G_3 \geq 0$. Furthermore, $|G_2| \leq |G_3|$ at any point (θ, c_1, c_w) , so that the government may be less responsive to the group that will receive open subsidies. The earlier case, where the c.d.f. was $G(\theta, c_1 - c_w)$, may be considered a special case where $|G_2| = |G_3|$. The consequences of the modification are hard to trace out. It may be that the optimal policy is closer to the "first-best" which would obtain in the absence of political constraints and political influence. Alternatively, it may be harder to achieve a "second-best" policy if the appropriate transfers cannot be made. In other words, the more that the set of possible transfer policies is restricted, the further will be the outcome from the "first-best." At a deeper level, this problem must arise from an informational asymmetry that goes in the opposite direction: constituents are not able to distinguish subsidies that help to improve efficiency from those that are simply redistributive and increase inefficiency. This leads them to oppose subsidies based on their transparency. We do not attempt to formally model this kind of informational gap, but it is reminiscent of the issues dealt with in Rodrik's (1989) analysis of credibility of reform policies.

The second issue in interpretation of the FL analysis concerns the government's objective function. The model assumes that, while the government is constrained by political acceptability, it does seek to maximize aggregate social welfare in a utilitarian sense. Suppose, however, that the government values its revenue more than the utility of individuals. There is some schizophrenia assumed here, since the government decisionmakers are also constituents, but it is useful to ignore here what is a difficult question. Suppose, therefore, that the

government's objective is

$$\underset{\{T(\theta), x(\theta)\}}{\text{maximize}} \int_{\underline{\theta}}^{\bar{\theta}} \{\Phi(x(\theta) + \theta)y_0 - p^1 x(\theta) - T(\theta) + \eta(T(\theta) + \bar{B})\} dF(\theta)$$

where $\eta \geq 1$. The higher is η , the more the government cares about its revenue relative to the utility of individuals. Now the transfer payment $T(\theta)$ does not disappear from the objective function through cancelling out. What this does is to effectively increase the shadow price associated with the government's budget constraint. If that were λ before, it now becomes $\lambda + \eta - 1$. Effectively, this is as if the government's budget constraint were tighter than it actually is. With a tighter budget constraint, the government will reform less strongly. That is, if the government cares about its revenue per se, it is less willing to initiate reforms that cost it money. Put this way, the conclusion is straightforward.

Note that this modification can be combined with those suggested earlier, that allow for active rent-seeking or different political constraints. In that context, one could also allow for some fraction of the rent-seeking outlays, c_1 and c_w , to be transfers to the government which enter its objective function. In that case, however, one has to modify in some manner the modelling of the game between lobbying groups and government, since the groups were assumed to choose their outlays to influence government policy, and here the government must choose policy to influence lobbying outlays. The modification required is therefore not obvious.

To summarize, the FL story is suggestive of the problems of trade reform in less developed countries, as well as price reform in general, in the case of consumer goods in particular. Governments that reduce tariffs harm domestic suppliers, and this may be politically unacceptable. Reducing tariffs is also costly to the government, and this, too, lessens its ability and possibly its willingness to undertake such reform.

I next describe a related analysis, by Lewis, Feenstra and Ware (LFW, 1989), where the issue is one of removing subsidies, i.e., allowing consumer prices to rise and producer prices to fall. I discuss the additional complications that arise when production is introduced into an analysis such as that of FL.

LFW examine the problem of removing subsidies or price supports in situations where the government is informationally and politically constrained. The model and analysis have many features in common with that of FL. The result is a second best policy, since eliminating the subsidy by lump-sum transfers will be too costly a way to overcome the informational and political constraints.

The model assumes a large number of independent single producers, who differ in their productive efficiency. The cost of producing output q to a worker of type θ is $(k - \theta) c(q)$. Hence workers with higher θ 's are more productive. Initially there is a per unit subsidy s , and the market price without the subsidy is assumed to be exogenously given at p . This is as if the demand curve were horizontal, and there were no consumer surplus. Even otherwise, the assumption means that the subsidy affects only producers, not consumers. I will discuss later the implications of relaxing this assumption.

Initially, therefore, profits for producers of type θ are given by

$$\pi^0(\theta) = \max_q (p + s) q - (k - \theta) c(q)$$

If the optimal output for a worker is positive, it is given by the first-order condition

$$(p + s) - (k - \theta) c'(q^0(\theta)) = 0.$$

The optimal output in the absence of a subsidy is obtained by putting $s = 0$, and denoted $q^*(\theta)$, which is less than $q^0(\theta)$.

Types, θ , are assumed to be distributed uniformly over the unit interval $[0, 1]$. Workers also have an outside option that gives them v , so since π^0 is increasing in θ , there is a cutoff level $\hat{\theta}^0$ given by $\pi^0(\hat{\theta}^0) = v$, such that workers below $\hat{\theta}^0$ choose the alternative occupation, and those above choose the subsidized industry. In the absence of the subsidy, therefore, fewer workers would choose this industry: the cutoff level would be $\hat{\theta}^* > \hat{\theta}^0$.

The simplest form of the political acceptability constraint in this context is that the measure of those not made worse off by any policy change be at least some level, i.e.,

$$\int_{\theta \in \tilde{M}} dF(\theta) \geq M,$$

where M is the critical level of support, F is the distribution function, $\tilde{M} = \{ \theta | \pi(\theta) \geq \pi^0(\theta) \}$ is the set of workers not harmed, and $\pi(\theta)$ is the post-reform profit for type θ . If $M = 1$, then as in FL, nobody must be harmed by the subsidy reduction. A more general case also suggested by LFW is where the political acceptability constraint is

$$\int g(\pi(\theta) - \pi^0(\theta)) dF(\theta) \geq M,$$

where $g(\cdot) = 0$ for $\pi(\theta) < \pi^0(\theta)$ and is nondecreasing so that numbers of types are weighted by the gains they receive. The first case then corresponds to $g(\cdot) = 1$ whenever $\pi(\theta) - \pi^0(\theta) \geq 0$. LFW show that in the simple case, as well as in general, the set \tilde{M} has the form $[\hat{\theta}^0, \theta']$, i.e. workers of lower productivity are benefitted by the policy. This is intuitive, since it should be optimal to bribe less productive workers to leave the industry as the subsidy is reduced.

The optimal policy itself consists of a menu of pairs (q, T) , where q is the level of output the worker supplies, and T is the total compensation that the worker receives from market and government sources. T can be therefore thought of as the market value of output, pq , plus a transfer τ from the government. This menu can include cases where q is zero, and $T = \tau$ is compensation for exiting the industry. Hence, the worker's profit if she chooses menu option $\{q(\tilde{\theta}), T(\tilde{\theta})\}$ is $\pi(\tilde{\theta} | \theta) = T(\tilde{\theta}) - (k - \theta) c(q(\tilde{\theta})) + \delta(\tilde{\theta})v$, where δ equals 1 whenever the worker exits and 0 otherwise. The informational constraint, therefore, incorporating the revelation principle, is

$$\pi(\theta) = \pi(\theta | \theta) \geq \pi(\tilde{\theta} | \theta),$$

for all $\tilde{\theta}$, θ in the set of types originally in the industry.

Since the government does not have to bother with consumers, it maximizes the net surplus from industry production. If

$$W(q, \theta) = pq - (k - \theta) c(q) + \delta v,$$

net surplus is

$$W(q, \theta) - \lambda (T - pq),$$

where λ represents the a marginal social cost of raising funds $T - pq$. Note that we could add on λ times the cost of the existing subsidy without affecting the government's decision. λ can also be interpreted as in FL, as the Lagrange multiplier associated with a government budget constraint. Substituting for T , the last expression becomes

$$(1 + \lambda) W(q, \theta) - \lambda \pi(\theta),$$

and this can be renormalized by dividing through by $1 + \lambda$, so that the government's objective is to maximize

$$\int \{W(q(\theta), \theta) - \alpha \pi(\theta)\} dF(\theta),$$

where $\alpha = \lambda/(1 + \lambda)$, subject to the informational and political constraints.

In this problem, unlike that of FL, lack of unanimity changes the nature of the solution.

The general solution has the form

$$q(\theta) = \begin{cases} \bar{q}(\theta) > q^*(\theta), & \tilde{\theta} \leq \theta \leq \theta_1, \\ \bar{q}, & \theta_1 \leq \theta \leq \theta_2, \\ \bar{q}(\theta) \leq q^*(\theta), & \theta_2 \leq \theta \leq 1, \end{cases}$$

where $\tilde{\theta}$ is the new cutoff level. The nature of this solution is as follows. Workers with types in the range $[\tilde{\theta}^0, \tilde{\theta}]$ are induced to exit through transfer payments that make them better off.

Workers in the range $[\tilde{\theta}, \theta_1]$, have to be induced to stay rather than exit, and they are allowed to produce more than is optimal, though less than the level $q^0(\theta)$ with the full subsidy. Workers in the range $[\theta_2, 1]$ have to be taxed to reduce the cost of the reform, and this is politically feasible.

To balance these motives, workers in the middle are "pooled." To decentralize this outcome, one can again think of a nonlinear subsidy schedule menu of lump sum transfers and linear subsidy or tax rates. A kink in the subsidy schedule will lead to an interval of types all choosing the same output in a decentralized fashion.

Now if $M = 1$, the upper two regions of the interval disappear, so $\tilde{q}(\theta) \geq q^*(\theta)$, with equality only at $\theta = 1$, but $\tilde{q}(\theta) < q^0(\theta)$. In words, output is reduced part, but not all the way, towards efficient levels. This form of solution is similar to that in the FL model.

LFW go on to discuss variations of the simple case, in particular, what happens when political support depends on how much better off a worker is under reorganization. If $g' > 0$ for $\pi(\theta) - \pi^0(\theta) \geq 0$, they show that incentives for limiting producer rents are reduced, and output distortions decrease for $\theta < \hat{\theta}$, i.e. for those workers who are induced to exit the subsidized industry. A further complication is where outside opportunities are also increasing in θ , say $V(\theta)$, with $V'(\theta) > 0$. If $V(\theta)$ increases more rapidly than $\pi^0(\theta)$, workers with lower skills are in the subsidized industry, and the optimal policy may shift types from both ends of the distribution out of the industry.

The above discussion all assumes that the subsidy-free price, p , is exogenously given. In one possible interpretation, suggested by LFW, p is the world price and $p + s$ is the domestic price received by producers. Hence, consumers always pay the world price p even though the domestic demand curve is downward sloping. Any difference between supply and demand at p is made up by imports or exports. This is illustrated in Figure 1. In Figures 1a and 1b, D is the domestic demand curve, S the supply curve without the subsidy and S' with the subsidy. In Figure 1a, the subsidy reduces imports, but does not affect domestic consumption. In Figure 1b, the subsidy causes a switch from importing to exporting, but again domestic consumption and consumer surplus are unaffected. Free trade at the world price p gives producers all the benefits of the subsidy, and they bear all the costs.

Suppose instead the opposite extreme case of no trade in the subsidized good. With a downward-sloping domestic demand curve, both producers and consumers benefit from the subsidy. Conversely, both will be hurt if the subsidy is withdrawn. Suppose p^* is the equilibrium price in the absence of a subsidy, then $p < p^* < p + s$. For a given initial unit subsidy, therefore, the maximum profit function $\pi^0(\theta)$ will be lower, and the political acceptability constraint imposed by producers will be less stringent. However, there is now an

additional political acceptability constraint because consumers are made worse off by the removal of the subsidy. If consumers are all identical, they are all hurt by the removal of the subsidy. An identical lump sum transfer to each consumer, or to some subset of consumers, may restore political acceptability. In any case, it is not a priori clear whether this situation will make it harder or easier to reduce subsidies than in the LFW model. It will presumably depend on how numbers exactly translate into political influence. The reason this extension seems worth considering is that it captures a common issue of concern in less developed countries, that removing subsidies on items such as food will cost the government political support among consumers, and may be infeasible for that reason.

It is easy to see that the two issues raised and briefly modelled earlier, namely active lobbying and the relative transparency of policies, can also be incorporated in the production model in similar ways. Whether producers in the industry will form coherent groups may depend on to what extent they share other characteristics, e.g., if potential losers are regionally concentrated, they may more easily organize for lobbying. Issues of sustaining collective action are discussed in e.g., Olson (1971). It may also be the case that "buying-off" inefficient producers is infeasible because such payments are more transparent than a general subsidy and will hence be more actively opposed. The issue of the feasibility of subsidies will crop up again in our discussion of privatization, which follows in the next section.

Allocating Property Rights

The allocation of property rights can involve reallocating existing property rights, or assigning rights that are otherwise not clearly defined. The prime example, that of privatization of public enterprises, might be considered to fall into either category, depending on one's point of view and the realities of "public" ownership in different countries. The standard economic model of resource allocation may be of limited use in analyzing this issue as well. Clearly, well-defined property rights and competitive markets are beneficial according to the standard model: the outcome is then Pareto optimal. If the government wishes to alter the distribution of

welfare, it can do so by appropriate lump sum transfers of endowments: this is the "second theorem of welfare economics." In this paradigm, efficiency is not really a concern. Everyone uses their endowments efficiently. If someone can use a machine more efficiently than the initial owner, the machine can be rented or sold. All mutually beneficial transactions will take place once initial property rights are assigned.

One real-world complication is that markets are not complete. They may fail to exist because information that some have is not shared by others. Then the initial allocation of property rights may be important: the economy may be better off if the initial allocation of property rights gets the machine to the person who can use it most efficiently. One way of achieving this could be through some kind of auction mechanism. Of course the government faces the same, or worse, informational problems than do individuals. It cannot directly identify those who will be most productive in using assets, or those who value them most highly. Auctions have been identified as mechanisms that are good at overcoming such informational constraints. The way that the problem of auctioning property rights by a government may be considered to be different than usual auction models is in the objective function. The government cares not just about the revenue it receives, but also about the winning bidder's valuation of the asset, because this valuation reflects the social surplus to be generated from the asset's productive use. If post-auction markets are complete and competitive, the government's objective should be to maximize its revenue, since then the winner is the one who is most productive and is therefore willing to pay the most. If markets are incomplete, this may not be true because of resulting externalities: private valuation may not reflect social valuations. For example, the Treuhandanstalt may prefer to sell a former East German business not to the highest bidder, but to one that is most likely to maintain employment. If markets are not competitive, auction winners earn rents that do not properly reflect social benefits. This case will be the focus of the example I present next.

Before that, there is one further aspect to discuss. In looking at price reform, I described how political constraints have been incorporated in determining second-best government reform

policies. Do political constraints matter here? If we think of public enterprises as notionally owned by the population at large, one could think of the political constraint as simply one of how the revenues from auctioning or otherwise selling public enterprises are distributed. This might be decoupled from the decision of who gets to buy the firm. In practice, for large enterprises, as opposed to smaller ones that may be easily purchased by single owners or small groups, the situation is more complicated. The final allocation of ownership in a large firm may necessarily be among many relatively small shareholders. There is no single "winner" and the issue of how to value the aggregate asset based on individual valuations is unclear. Potentially, the mechanism design approach provides a systematic way of thinking about such problems and additional political constraints may be incorporated.

The simplest possible case of interest, however, is where the asset is a firm that will be a monopoly. This will be illustrative of more general cases of post-allocation imperfect competition. Such cases arise, for example, in awarding television or other communication franchises. Riordan and Sappington (1987, henceforth RS), provide an analysis of such a situation. They consider a situation where there are several, say n , bidders for a monopoly franchise. Potential firms have private information about costs. The regulator or other government agency announces a menu of contracts which specify: a franchise fee, a regulated price, and a production subsidy. Each potential firm then simultaneously announces its bid, and the franchise is awarded to the highest bidder. Thereafter, contracted payments are made in the order specified in the agreement. The government's objective is to maximize the expected value of consumer's surplus net of transfer payments to the producer, i.e., profits are given no weight in the government's objective function. Weighting producer profits does not qualitatively change the results, as I discuss later.

I first describe in more detail the informational assumptions and the second-best policy as derived by RS. The cost function for the enterprise is known to be of the form $K + cQ$, where Q is output, K is sunk/fixed cost and c is marginal cost. Initially, no one knows the level of c , only that it lies in the interval $[\underline{c}, \bar{c}]$. Firms learn about c before bidding, in that they receive

signals t_i , $i = 1, \dots, n$, that result in posterior c.d.f.s $F(c | t_i)$. A higher t shifts F to the left, so it is good news about costs, and implies a higher valuation. We can think of bids as announcements of t , and due to the revelation principle, the optimal policy is to elicit the truth. After the bidding is over, the winner learns the true value of c , and reports this also: again it is induced to be truthful. The menu of contracts is $\{T(c, t), p(c, t)\}$, where $T(c, t)$ is the net transfer to the producer, composed of a franchise fee $\Phi(T)$ and a production subsidy $S(c, t)$, i.e. $T = S - \Phi$; and $p(c, t)$ is the regulated price.

The optimal policy for the government as derived by RS, given the informational constraints and that the policy has to generate nonnegative profits, is a price which is above marginal cost by an amount that reflects the "informational rent" of the firm. It is similar to the formula originally derived by Baron and Myerson (1982) for a single regulated firm, except that it also incorporates the bid made by the winning firm. The formula is

$$p(c, t) = c + (1 - t) \frac{\partial F(c | t) / \partial t}{f(c | t)}.$$

From the formula, we see that if $\partial F(c | t) / \partial t = 0$, i.e., potential buyers do not have private information at the bidding stage, the optimal price will be the marginal cost. In Baron and Myerson, where there is no bidding stage, and even in the special case of their model where the weight given to profits is zero, as in RS, price is optimally above marginal cost. Hence, bidding allows for a more competitive solution, even when the potential cost efficiency of producers is uncertain.

Like the price, the production subsidy paid to the winning bidder in the optimal policy does not depend on the number of bidders. Thus the production subsidy also has a form similar to that for optimal regulation of an existing monopolist, the problem analyzed by Baron and Myerson. Finally, the franchise fee does go up with the number of bidders. In the case of no private information at the bidding stage, the optimal subsidy is in fact realized consumers' surplus, and the franchise fee is the expected monopoly profit. This was the solution suggested by Loeb and Magat (1979). Note that it applies even when the winning bidder's cost is unknown

to the government. In general, however, there will be distortions resulting from firms' private information. Linking of the bidding and production stages will allow the government to secure a greater up-front payment from the producer, and this benefit outweighs the distortion in production decisions caused by pricing above marginal cost.

One might immediately question this kind of solution in the context of economic reform. It proposes continued government intervention through production subsidies and price regulation after the "privatization" of an enterprise. This is a consequence of the presumed monopoly and the assumed benevolence of the government, which maximizes consumers' surplus net of payments to the producer. While one might argue the benevolence of government in fledgling democracies, in countries such as India, the argument for reform such as privatizing public enterprises includes considerations such as freeing the government and industry of rent-seeking. In the current model, a partial way of allowing for government sensitivity to firms' interests is to weight profits along with consumer surplus, as in Baron and Myerson. In fact, as the weight on profits increases to parity with the weight on consumers' surplus, the regulated price falls towards marginal cost. In the RS model, the price formula if profit is given a weight of α is

$$p(c, t) = c + (1 - \alpha)(1 - t) \frac{\partial F(c|t)/\partial t}{f(c|t)}.$$

Thus when $\alpha = 1$, $p(c, t) = c$. Gross welfare is maximized in this limiting case, and its division between the firm and consumers is a matter of indifference, as long as the firm's profits are nonnegative. This reduction in price as the weight on profit increases seems paradoxical until one recalls the subsidy component of the regulation. The subsidy is in general an increasing function of α , as is the firm's profit. Net expected consumers' surplus is decreasing in α . Thus an increase in the weight on profits shifts welfare to the firm. The reason this is achieved by lowering price and increasing the subsidy is that as the weight given to profits increases, the need to limit information rents goes down, and direct transfers to the firm are the least costly way of providing it with profits.

If we reverse the above reasoning, we get some additional insight. Suppose that the ideal would be to maximize the sum of consumers' surplus and profits. However, political feasibility requires the government to give more weight to consumers' surplus. Then the result of the political constraint will be to reduce efficiency. This way of looking at things draws out a parallel between price reform and privatization, in that the government is not able to achieve full efficiency in reform because of political acceptability restrictions, whether these are separate constraints or modifications of objectives. The parallel might be made more exact by developing the following model. There are many consumers, each initially being a notional fractional owner of a given number of public enterprises. Each enterprise, when privatized, will generate rents due to imperfect competition. Consumers may bid for these enterprises, to become private entrepreneurs. In the absence of political acceptability constraints, privatization might dictate concentrating ownership in the hands of a few, more efficient, entrepreneurs. However, if this leaves a majority worse off after the reallocation because of the concentration of initial endowments, this might be politically infeasible. It seems that this model might be a useful one to develop in the context of wholesale privatization. Such considerations may be less critical in less developed countries such as India, where the nature of the loss to consumers from privatization is less transparent.

Two further issues are suggested by the Indian case. First, privatization may create some additional gains that can reduce political constraints. The gains will come from increased efficiency of operation. This is not just an issue of exogenously lower costs, but also of mitigating moral hazard type incentive problems that are common in public enterprises insulated from the consequences of inefficient decision-making. This points the way to a second issue, of an additional political constraint. Those who will oppose the reforms are likely to be workers in public enterprises who are made worse off under privatization. This is at least somewhat similar to the price reform model of LFW. If we interpret privatization as tantamount to the removal of production subsidies, the political constraint is the requirement to compensate workers in the process of reform. A similar, though somewhat broader problem is addressed by Shleifer and

Vishny (1992) in the context of privatization in the ex-Soviet Union. They discuss how de facto property rights of workers, managers, minorities, and local governments may need to be bought off before privatization can proceed.

We cannot tackle all of these issues here, since that would require modelling the whole economy as well as the internal organization of large firms. The issue of increased efficiency is easily handled, however, in the RS framework. Net expected consumers' surplus in their model is

$$\int_0^1 \int_{\underline{c}}^{\bar{c}} [W(Q(b,t)) - T(b,t)] n t^{\alpha-1} f(b|t) db dt.$$

In this expression, $W(Q) \equiv \int_0^Q P(s) ds - P(Q)Q$, or consumers' surplus before transfers. Suppose that the cost of the existing firm is c_n . If $c_n > \bar{c}$, the privatization will surely increase efficiency. If $c_n \in [\underline{c}, \bar{c}]$, efficiency may increase, but this is not guaranteed. If c_n is known and $\alpha = 1$, the initial solution will involve marginal cost pricing and a subsidy to the public enterprise that at least covers its cost. The exact subsidy is indeterminate because consumers' surplus and profits are equal contributors to overall welfare.

Now, with privatization and the auction of the firm or franchise to a more efficient producer, production efficiency may go up, but the efficient winner of the auction will earn informational rents that were not present before. This may reduce consumers' surplus. In that case, a political constraint that consumers' surplus not go down will be violated. Adding such a constraint will modify the RS-type solution, making it harder for the government to identify the efficient producer in the privatization process. This type of model more closely parallels the FL and LFW analyses, where the status quo defines the political constraints on reform.

Finally, note that lobbying and the issue of transparency of policies can be introduced here as they were earlier. Consumer and producer lobbying may affect the government's value of α , the weight given to profits. Switching from subsidizing a public enterprise to similarly subsidizing a private one may be problematic because the latter is more transparent and

politically harder to implement, even though the result is more efficient. Again, some inability on the part of constituents to distinguish government motives would be the underlying factor.

Conclusion

In this paper I have examined the government's role in economic reform with a focus on two aspects: lack of information and political constraints. The government may not be able to identify winners and losers of reform policies, and it may not be able to identify the efficiency of private producers. Together with requirements placed by political acceptability, this lack of information can substantially affect the nature of feasible reform policies. Cases where there is asymmetric information are naturally handled by the mechanism design approach. I have illustrated this by summarizing the work of Feenstra and Lewis (1991) and Lewis, Feenstra and Ware (1989) in the context of price reform. I have then discussed the features of political constraints that are not fully incorporated in those models, and sketched out how they might be included. In the context of privatization, I have summarized work by Riordan and Sappington (1987), and suggested how it might be extended to include political factors.

This paper is not, of course, an exhaustive survey of the issues of economic reform, nor of modelling strategies. Aspects not dealt with here include credibility (Rodrik, 1989), commitment (Dooley, et al., 1993), adjustment costs (Fernandez and Rodrik, 1991) and speed (Wei, 1993, Dewatripont and Roland, 1992). Even these references are just a small sample. Numerous books on economic reform issues have been published (e.g., Clague and Rausser, 1991) and conferences held (see Kohli, 1993, for a summary report on one such conference). This paper is, I hope, a useful contribution to understanding the many issues of economic reform.

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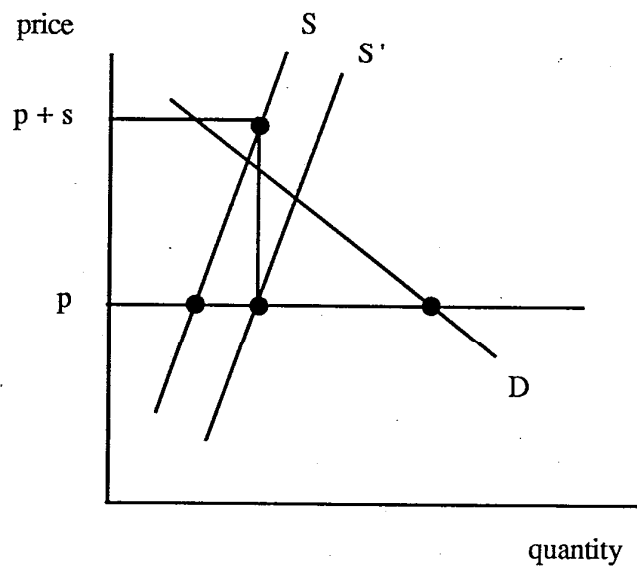


Figure 1a

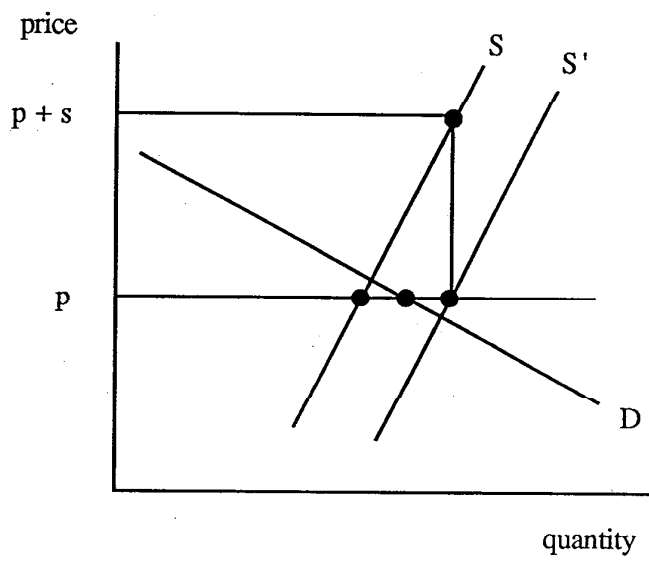


Figure 1b